Application Note POLYMER006

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POLYMER006: In-situ X-ray Diffraction Measurement to Visualize Molding Conditions and Structural Changes

Introduction

The internal structure of resin molded products varies greatly depending on molding conditions (temperature, pressure, cooling rate, etc.). In particular, the crystal structure, crystallinity, and orientation state directly affect the strength, rigidity, heat resistance, and appearance of the product, making evaluation essential. Rigaku's X-ray diffractometer enables real-time observation of structural changes during heating and cooling using a temperature control attachment, making it possible to directly evaluate the relationship between molding conditions and structural changes.

Crystal phase analysis

Analysis:	Raw and parts products
Use:	Process control, failure analysis, quality assurance
Analyzed materials:	PET

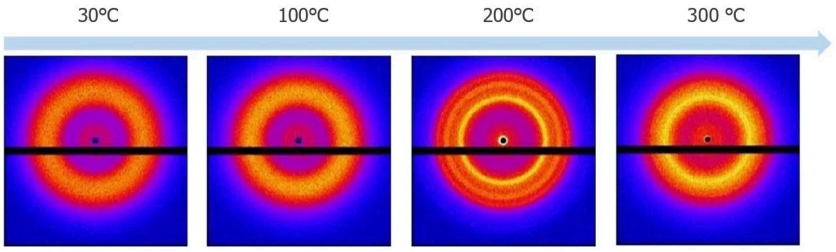

Figure 1: 2D measurement results of PET film at various temperatures

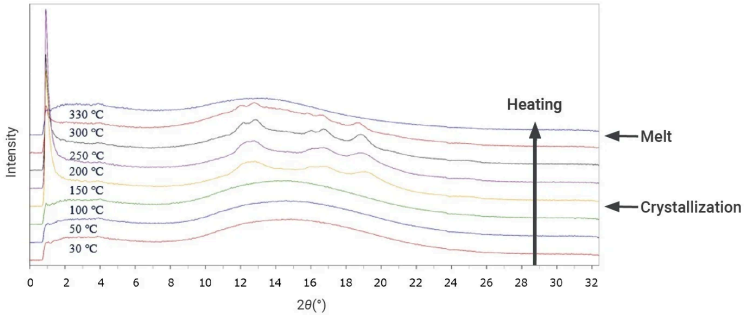

Figure 2: Variation of 2θ-Int. transformation profiles at different temperatures

Conclusion

Temperature-controlled XRD measurements were performed on PET film to visualize the progression of crystallization and melting during heating in 2D images and profiles. The in-situ measurement allows us to follow the structural changes in real time, providing quantitative data directly related to the optimization of molding conditions.

Related products

DicifferX WAXS Edition

Wide-angle X-ray Scattering (WAXS) system revealing the st
ructures of polymer materials